



**Offre n°2025-09158**

## **Engineer -- market places simulation and incentives**

**Niveau de diplôme exigé :** Graduate degree or equivalent

**Fonction :** Temporary scientific engineer

### **A propos du centre ou de la direction fonctionnelle**

The Inria Saclay-Île-de-France Research Centre was established in 2008. It has developed as part of the Saclay site in partnership with **Paris-Saclay University** and with the **Institut Polytechnique de Paris** .

The centre has 40 [project teams](#) , 27 of which operate jointly with Paris-Saclay University and the Institut Polytechnique de Paris; Its activities occupy over 600 people, scientists and research and innovation support staff, including 44 different nationalities.

### **Contexte et atouts du poste**

The recruited engineer will work in the FairPlay team. FairPlay is a joint team between Inria, ENSAE and Criteo with around 8 permanent researchers and 15 PhD students/postdocs from all three partners institution. The team is bi-localized, hosting at CREST (on the Polytechnique campus) but working from Criteo HQ in Paris once a week.

Several of the researchers (incl. the team's heads Vianney Perchet and Patrick Loiseau as well as PhD students) are working on topics related to the engineer's position and the engineer will interact with them both to understand their need and provide them with tools that can create new results. The recruited engineer will also benefit from interactions (and support as needed) with engineering teams from both Inria (SED) and Criteo.

### **Mission confiée**

The recruited engineer will support the team by developing prototypes of research products. (S)he will work on two projects. Both projects are key to the FairPlay team, but the first project will be prioritized at least in the beginning.

**Development of an AI-based simulator of markets**

Markets such as the online advertising market organize many important parts of society and industry. Online platforms often seek to devise global rules to optimize several metrics of those markets such as efficiency, revenue, and fairness. However, markets are difficult to model, design, and analyze due to having many agents interacting with their own objectives; and market designers usually fall short of explicit solutions because of the complexity of these systems.

To address this issue, the team proposes a completely different approach based on simulating the market instead of trying to model it precisely, using deep reinforcement learning to let agents learn optimal strategies through interactions. The goal of this project is therefore to build an agent-based simulator of a market that takes into account relevant features such as supply-demand dynamics, heterogeneous agent behavior or regulatory constraints. Then, based on this simulator, we should be able to optimize the market parameters, such as the ad auction mechanism (using automated differentiation).

This project follows a recent trend initiated by the "AI economist" (<https://github.com/salesforce/ai-economist>) for different purposes (tax). A simple initial code in the case of a simplistic labor market was done at ENSAE (<https://github.com/coni26/MARL-Labor-Market>). The goal of the engineer will be to develop a complete simulator for the online advertising market. This includes in particular coding modules for the different market aspects (agents, policies, etc.). The code will be done in Python and open source libraries can be used for RL tasks. The simulator should then be packaged as a reproducible environment.

### **Datacoop: a platform for incentivized data sharing**

Machine learning models use datasets for training. In many cases, several datasets exist, owned by different entities, and the machine learner would like to incentivize the dataset owners to join a coalition that pools all the datasets together to learn a common model. This requires to be able to quantify the value that a dataset adds to the machine learning model (e.g., to its accuracy). In a recent paper (NeurIPS 2024), we proposed a new method to evaluate this contribution through an efficient approximation of the Shapley value.

The objective of the engineer will be to develop a proof-of-concept of the datacoop based on our valuation method. This will be done in cooperation with the product team of Criteo, in particular for design choices.

## **Principales activités**

The main activity will be the development of code to support research as well as to make it accessible to the public. The recruited engineer will be in charge of the whole development pipeline (coding, testing, documenting, distributing, etc.).

## **Compétences**

Technical skills and level required:

The main competence required is Python programming. Understanding of machine learning basic concepts and experience in using some of the libraries (e.g., for reinforcement learning) is a plus but is not strictly necessary as it can be learned somewhat easily.

The following will be a plus (we do not expect necessarily all):

- knowledge of C++ to optimize the code.
- competence in code organization and reproducible development tools.
- competence in developing a user-friendly interface.

Languages:

English is required, French is not.

Relational skills:

Capability to interact with the team of researchers.

## Avantages

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking (after 6 months of employment) and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Social security coverage

## Rémunération

Remuneration : in regards to your professional experience

## Informations générales

- **Thème/Domaine** : Optimization, machine learning and statistical methods Statistics (Big data) (BAP E)
- **Ville** : Palaiseau
- **Centre Inria** : [Centre Inria de Saclay](#)
- **Date de prise de fonction souhaitée** : 2025-10-01
- **Durée de contrat** : 2 years
- **Date limite pour postuler** : 2025-09-30

## Contacts

- **Équipe Inria** : [FAIRPLAY](#)

- **Recruteur :**  
Loiseau Patrick / [patrick.loiseau@inria.fr](mailto:patrick.loiseau@inria.fr)

## A propos d'Inria

Inria est l'institut national de recherche dédié aux sciences et technologies du numérique. Il emploie 2600 personnes. Ses 215 équipes-projets agiles, en général communes avec des partenaires académiques, impliquent plus de 3900 scientifiques pour relever les défis du numérique, souvent à l'interface d'autres disciplines. L'institut fait appel à de nombreux talents dans plus d'une quarantaine de métiers différents. 900 personnels d'appui à la recherche et à l'innovation contribuent à faire émerger et grandir des projets scientifiques ou entrepreneuriaux qui impactent le monde. Inria travaille avec de nombreuses entreprises et a accompagné la création de plus de 200 start-up. L'institut s'efforce ainsi de répondre aux enjeux de la transformation numérique de la science, de la société et de l'économie.

## L'essentiel pour réussir

The successful candidate should have a taste for working with researcher and for developing solutions for economically-motivated problems and for data-related problems.

(S)he can either be a graduate from CS/engineering studies (M2 level) or have a PhD with a coding component. Post-diploma coding experience is appreciated but not necessary.

**Attention:** Les candidatures doivent être déposées en ligne sur le site Inria. Le traitement des candidatures adressées par d'autres canaux n'est pas garanti.

## Consignes pour postuler

### Sécurité défense :

Ce poste est susceptible d'être affecté dans une zone à régime restrictif (ZRR), telle que définie dans le décret n°2011-1425 relatif à la protection du potentiel scientifique et technique de la nation (PPST). L'autorisation d'accès à une zone est délivrée par le chef d'établissement, après avis ministériel favorable, tel que défini dans l'arrêté du 03 juillet 2012, relatif à la PPST. Un avis ministériel défavorable pour un poste affecté dans une ZRR aurait pour conséquence l'annulation du recrutement.

### Politique de recrutement :

Dans le cadre de sa politique diversité, tous les postes Inria sont accessibles aux personnes en situation de handicap.